
Site planning basics

The basics of planning a site

Planning a site involves the following tasks:

- determining site-specific information
- planning for outdoor coverage (as required)
- surveying the site
- determining how much equipment is required to cover the site
- reviewing your work

“Planning a Sample Site” on page 43 uses an example to describe these tasks. Methods and examples for surveying more detailed sites are described in “Planning complex sites” on page 57.

You will use one or more of the following surveying methods in your site survey:

- single floor
- multiple adjacent floors
- subsequent system installation
- high portable density area
- multiple systems installation

Site planning prerequisites

Before you go to the site, make sure that you have the following:

- a working CDT and portable telephone
- any keys needed for secured areas where you require coverage
- copies of the site floor plan (one working and one clean copy)
- a pencil, an eraser, a ruler and colored pens
- a page from the appropriate Companion Provisioning Record
- any required safety equipment, such as a hard hat or safety glasses
- the appropriate Companion installation guide

Required site information

You need the following information to accurately plan a site:

- the name and telephone number of the site contact
- the number of portables, the boundaries of the coverage area, and the proposed Companion system
- the location of the telephone switching room
- whether the customer requires outdoor coverage
- whether the customer wants to reduce the number of Base Stations by not covering areas that require more intensive coverage, such as restrooms, stairwells or basements
- whether there is another system on the site
- whether users have a desk telephone in their office

Note: An office is any area where users can make and receive calls on their portables while sitting at their desks or in their cubicles.

- how to get access to secured areas
- whether it is acceptable to install Base Stations on the ceiling
- whether the Base Stations must be hidden from view

You also need to determine the mobility of the users. For instance, you need to know whether the users move from cell to cell or whether they will always be within one cell.

Use one copy of the floor plan as a working copy to identify critical points, cell centers and cell boundaries. Use the other copy as a clean copy and attach it to the site Provisioning Record for the installer, customer, maintenance and anyone else who needs to see your work.

Note: The floor plans should include a scale. The scale is used for the range for outdoor coverage and to check wiring distances from the Controller to the Base Stations.

Labeling a floor plan

Clearly mark information on the floor plans during planning. Your customer, the sales group, the installer and maintenance personnel need to read these floor plans.

Use a different color for each cell. Use the same color for each cell center and its corresponding cell boundaries. Indicate the information on the floor plan as follows:

- critical points—mark  on the floor plan
- cell centers—mark  on the floor plan. Label each cell center xCn where x is the floor and n is the next sequential cell center.

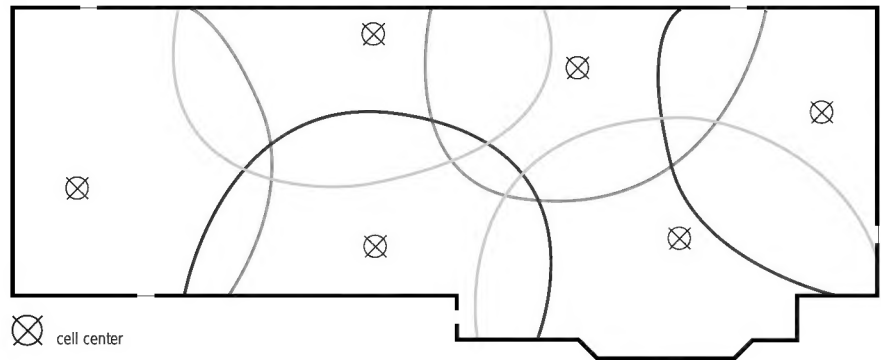
For example, label a cell center on the second floor 2C4. The 2 tells you that the cell center is on the second floor; the 4 tells you that this cell is the fourth cell in sequence in the planning process.

Table 5: Example cell labels

Floor	Cell label
second floor	2C4, 2C5
first floor or outdoors	1C1, 1C2, 1C3
basement	-1C6, -1C7

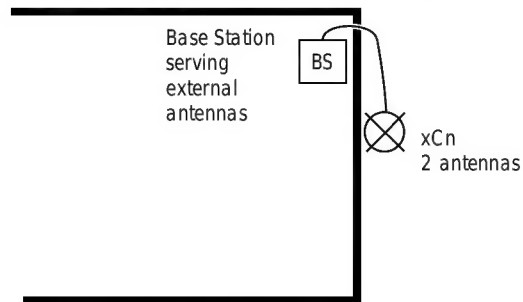
- cell boundaries—mark wide, colored lines on the floor plan

Figure 11: Example cell boundaries



Identify external antennas and which Base Station connects to them, as shown Figure 12.

Figure 12: Labeling external antennas on the floor plan



Note: The system administrator needs to know the position of any external antennas and the position of the Base Station that connects to them.

Cell center location

Covering outdoor areas

Note: The customer decides whether the site requires outdoor coverage.

Cover outdoor areas before covering indoor areas.

Use the CDT to determine the outdoor coverage provided by a Base Station located indoors. Because you cannot use the CDT transceiver outside, use Table 6 on page 28 to estimate the coverage of outdoor external antennas.

For each cell center requiring outdoor external antennas, it is best to plan for two, four, six or eight outdoor external antennas. Connect each pair of outdoor external antennas at a cell center to the same Base Station. If you only connect one radio to an external antenna serving the same cell center, it is best to disconnect the other radio. If you use external antennas and you have the two radios in the same Base Station serving different cells, users in the area could have poor audio quality links and they could drop their calls.

Steps for outdoor planning

1. Note each of the critical points that you want to reach.
2. Position the CDT transceiver indoors at the potential location for a cell center that is closest to the critical point (preferably next to a window).
3. Take your portable outdoors and determine if the critical point is within the cell boundary.

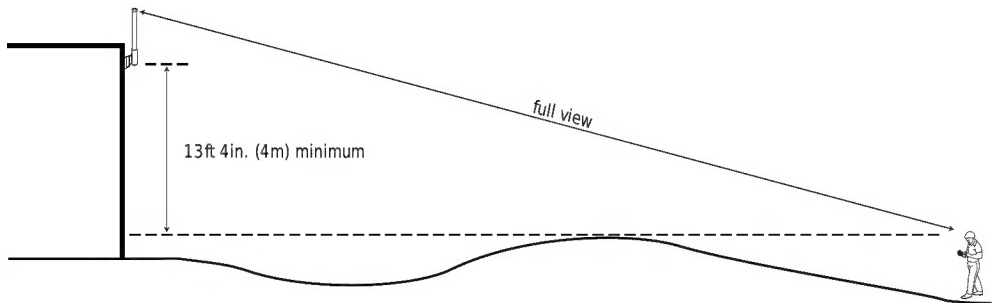
If the critical point is within the cell boundary, your cell center is at the position of the CDT transceiver. Determine and record the cell boundary for the cell center (both indoors and outdoors) on the floor plan (see “Cell center location” on page 26).

If the critical point is not within the cell boundary, determine and record on the floor plan the cell boundary that you did reach.

4. For each critical point that cannot be reached, determine a potential location for outdoor external antennas using the following criteria:
 - Is it outdoors?
 - Is it as close as possible to the critical point you need to reach?

- Is it within 33 ft (10 m) (wiring length) of a place where you can install a Base Station?
- Is it more than 13 ft 4 in. (4 m) above the highest ground you need to cover? (Installing the antenna at a lower height reduces the range.)

Figure 13: Elevation of outdoor external antenna and terrain



5. Determine the path required to run a coaxial cable from where you plan to install a Base Station to the potential location of outdoor external antennas.
6. Determine the length of these coaxial cables. Keep their length as short as possible (33 ft [10 m] or less).
7. Using the length of the coaxial cables and the outdoor terrain, refer to Table 6 to estimate the range for outdoor coverage.

Note 1: Use Table 6 only when the external antenna is 13 ft 4 in. (4 m) or more above the highest terrain.

Note 2: The range does not encompass any structures or earth mounds greater than 7 ft (2 m) tall and 7 ft (2 m) wide.

Table 6: Range for outdoor external antennas (ft [m])

Coaxial cable length	Maximum outdoor range		
	Lawn or ponds	Woods	Full parking lots
3 (1)	550 (168)	130 (39)	230 (70)
7 (2)	540 (165)	125 (38)	220 (67)
10 (3)	530 (162)	125 (38)	210 (64)
13 (4)	520 (159)	125 (38)	200 (61)
17 (5) ¹	515 (155)	120 (37)	190 (57)
20 (6)	510 (152)	120 (37)	180 (55)
23 (7)	500 (149)	115 (36)	170 (51)
27 (8)	480 (146)	115 (36)	160 (48)
30 (9)	470 (143)	115 (36)	150 (45)
33 (10) ¹	460 (140)	115 (36)	140 (42)

1. For PCI protocol, only these lengths of cable are available.

8. Using the potential location for outdoor external antennas as a center point, draw a circle on the floor plan with the radius equal to the range found in Table 6. Remember to crop the arc of the circle around structures and earth mounds.

Use the most suitable coverage area to select your cell center—either the coverage area based on Table 6 or the coverage area determined in step 2 using the CDT.

Note: If you recommend external antennas, inform the customer that you estimated the coverage area.

If you could not reach the critical point determine whether the customer wants you to continue planning.

9. Repeat this procedure until you completely cover all of the outdoor areas.

Covering a single floor indoor area

Surveying the site

Survey the site by working from one side of the coverage area to the middle of the coverage area. Then go to the other side of the coverage area and work back toward the middle until you have mapped all of the coverage area. Check your floor plan to ensure there are no areas where a portable in the required coverage area could be outside the range of a cell center.

Note 1: By surveying your site in this way, cell centers are distributed throughout the site. If you survey the site from one end to the other, you could cluster cell centers at one end of the site.

Note 2: Repeat this procedure until all areas in the required coverage area are within range of a cell center. Defining a cell typically takes 25 to 40 minutes.

Identifying critical points

1. Identify the initial critical points needed to determine a cell center. (A critical point is an outer corner of the coverage area, or a point that may be difficult for the radio signal to reach.)
2. Mark the critical points on the floor plan with .

Note: When determining the location of a cell center, you typically use one or two critical points.

Locating cell centers

1. Set up the CDT transceiver at a critical point and establish a link.
2. Check the floor plan to see if the critical point is within an office area.

If the entire area is office area, use -70 dBm as the cell boundary value. If there are no, or only a few, users' offices, use -73 dBm as the cell boundary value.

Note: Refer to your portable user guide for instructions on how to store cell boundary values for later recall.

3. Measure the range into the coverage area in a few directions to determine where a cell center can be located and still be within range of the critical point.
4. Mark a small x on the floor plan where you reach cell boundary values. Draw a thin contour line through the x's.
5. Select another nearby critical point and repeat steps 1 to 4.

Note: The intersection of the contour lines is a potential cell center.

6. Choose a position on the floor plan for the cell center that
 - is farthest from the critical points and is still within range
 - complies with the Base Station installation guidelines
 - is in the coverage area
7. Label the cell center on the floor plan with xCn, where x is the floor and n is the cell number in sequence of the entire plan.

Locating cell boundaries

1. Set up the CDT transceiver at the cell center and establish a link.
2. Check the floor plan for possible users' offices within the cell.

If the entire area is office area, use -70 dBm as the cell boundary value. If there are no, or only a few, users' offices, use -73 dBm as the cell boundary value.
3. Find the cell boundary position by measuring the range and recording it on the floor plan with a small x.
4. Move back toward the CDT transceiver until the tone from the portable changes from intermittent beeps to a continuous tone.

Note 1: Walk into all of the areas (rooms) necessary to determine the complete cell boundary. Radio signals travel farther in uncluttered areas than they do in cluttered areas.

Note 2: Repeat steps 3 and 4 until you make enough x's to draw a contour line around the cell center (12 x's for a full 360° around a cell center are enough).

5. If you chose a cell boundary value of -73 dBm and a user's office is within the cell, confirm that the office is within -70 dBm of the cell center. Reset the CDT to -70 dBm and find the cell boundary in the office area. If any of these users' offices are not within -70 dBm of the cell center, consider these users' offices as outside the cell.
6. Mark each office within the cell that is not in the office area.
7. Label any subsequent critical point on the floor plan with .

Completing the single floor plan

As you locate cells, trace the cell boundaries and label the cell centers with colored markers.

Repeat “Locating cell centers” and “Locating cell boundaries” to define the cells for the subsequent critical points.

Single-floor coverage techniques

This section shows you three single-floor planning techniques:

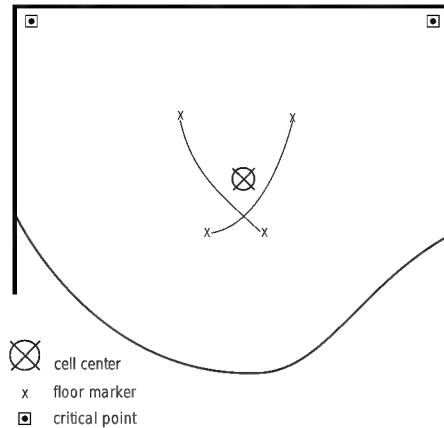
- single-cell—used to cover the distance between two outside corners at the end of a coverage area with one cell
- double-cell—used to cover the distance between two outside corners at the end of a coverage area with two cells
- multi-cell—used to cover the distance between two outside corners at the end of a coverage area with more than two cells

You always start planning with the single-cell technique because you do not always know what the range is or how many cells you will need to cover the area between the critical points.

Single-cell technique

Always start with the single-cell technique regardless of the distance between the two critical points. With this technique you find one cell center that serves two critical points, as shown in Figure 14.

Figure 14: Single-cell distance technique



1. Identify the initial critical points and mark them on the floor plan with .

Note: When determining the location of a cell center, you typically use one or two critical points.

2. Follow the steps of “Locating cell centers” on page 29.

If the contour lines do not cross, or they cross close to the edge of the coverage area between the two critical points, follow the steps in the “Double-cell technique” on page 33.

3. Follow the steps of “Locating cell boundaries” on page 30.
4. Repeat these steps for the remaining coverage area from the boundaries of the coverage area toward the center until you cover all of the floor.

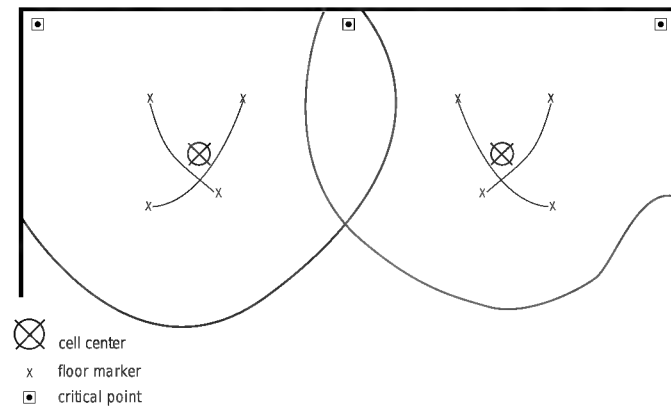
If the cell boundary covers any other critical points, ignore them when proceeding with coverage planning.

Double-cell technique

Note: Follow the double-cell technique only if you are referred here from the single-cell technique.

Before you begin this technique you should have two critical points that one cell center cannot serve. Using the double-cell technique, you find two locations for cell centers that cover three critical points, as shown in Figure 15.

Figure 15: Double-cell distance technique



1. Mark a third critical point midway between the two critical points already identified and place the CDT there.
2. Establish a link and walk briskly into the coverage area within range of the first critical point until you reach the cell boundary.
3. Mark a small x on the floor plan where you reached the cell boundary.
4. Repeat steps 2 and 3 several times, walking in different directions to get an idea where the cell center can be located and still be within range of the third critical point.
5. Draw a thin contour line through the X's on the floor plan.
6. Repeat steps 2 to 5, walking into the coverage area of the second critical point.

Note: If the contour lines do not cross, or if the point where they cross is close to the edge of the coverage area between the midway

critical point and either of the first two critical points, follow the steps of “Multi-cell technique” on page 34.

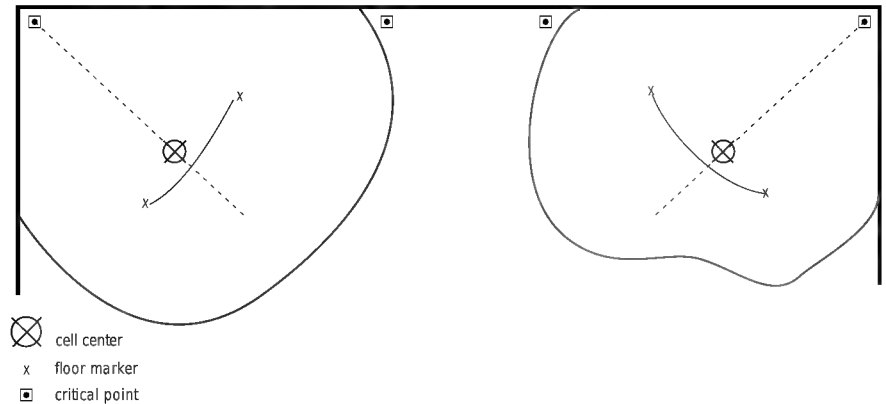
7. Choose a location for the cell center on the floor plan that
 - is the farthest from the midway critical point and one of the first two critical points, and is still within range of the critical points
 - complies with the Base Station installation guidelines
 - is within the coverage area
8. Mark each cell center on the floor plan  and label them 1C1 and 1C2.
9. Follow the steps of “Locating cell boundaries” on page 30 for each cell center.
10. Repeat this technique for the remaining coverage area from the boundaries of the coverage area toward the center until you cover all of the floor.

If the cell boundary covers any other critical points, ignore them when proceeding with coverage planning.

Multi-cell technique

Note: Follow the multi-cell technique only if you are referred here from the double-cell technique.

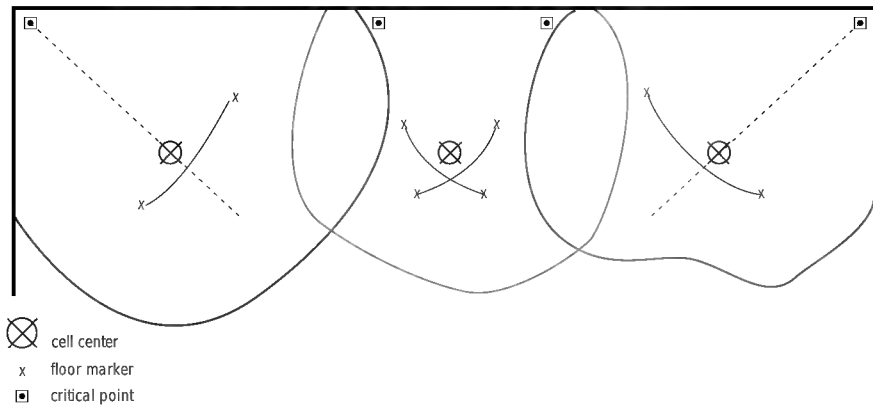
Before you begin this technique you should have two critical points that one cell center cannot serve. Using the multi-cell technique you find two cell centers, each one serving one of the two critical points, as shown in Figure 16.

Figure 16: Multi-cell distance

1. Choose a location for the cell center on the floor plan that
 - is the farthest from one of the critical points and is still within range
 - lies on the dividing line between the two edges of the coverage area
 - complies with the Base Station installation guidelines
 - is within the coverage area
2. Mark each cell center on the floor plan  and label them 1C1 and 1C2.
3. Follow the steps of “Locating cell boundaries” on page 30 for each cell center.
4. Define and mark on the floor plan any subsequent critical points where each cell boundary crosses the edge of the coverage area.

Note: Use the subsequent critical points to fill in the coverage area between the first two cells using the “Single-cell technique” on page 32. An example of using the single-cell technique to plan a multi-cell distance is shown in Figure 17.

Figure 17: Filling a multi-cell gap with a single cell



If the cell boundary covers any other critical points, ignore them when proceeding with coverage planning.

5. Repeat the multi-cell technique for the remaining area to be covered from the boundaries of the coverage area toward the center until all of the floor is covered.

Determining the number of Base Stations per cell

1. Divide the floor plan into cell areas, one area per cell, splitting cell overlap areas in half (see Figure 22 on page 48).
2. Count the number of users' offices in each cell area and record this number on the floor plan in each cell area.
3. Create a traffic table as shown in Table 7, with one column for each cell.

Table 7: Blank traffic table

	1C1	1C2	1C3	1Cn
Users inside the cell with an office				
Users with an office outside of cell who walk into the cell				
Users without an office				
Anticipated number of portables per cell				

Note 1: For each cell, complete steps 4 through 7.

Note 2: Assume that users will be in the cell where their office is 70 percent of the time and in another cell 30 percent of the time.

4. Calculate the total number of users in the cell with an office.

Users with an office in the cell x 0.7 = Users inside the cell with an office

Enter this number in the row, "Users inside the cell with an office."

5. Calculate the total number of users with an office outside the cell who walk into the cell.

Note: Do not count users without an office in this step.

(Total users with an office – Users with an office inside the cell) x 0.3

Total number of cells – 1

Enter this number in the row, "Users with an office outside of cell who walk into the cell."

6. Divide the number of users without an office by the number of cells.

$$\frac{\text{Total number of users without an office}}{\text{Number of cells}}$$

Number of cells

Enter this number in the row, “Users without an office.”

7. Add the values for each column (cell) and enter the result in the row, “Anticipated number of portables per cell.”
8. Determine the number of Base Stations per cell (see Table 8).

Table 8: Base Station requirements per cell

Anticipated number of portables per cell		Number of Base Stations
Users with a portable telephone and desk telephone	Users with only a portable telephone	
greater than 0 up to 3	greater than 0 up to 2	1
greater than 3 up to 12	greater than 2 up to 7	2
greater than 12 up to 27	greater than 7 up to 15	3
greater than 27 up to 44	greater than 15 up to 23	4
greater than 44	greater than 23	high density area ¹

1. Refer to “Planning an area of high portable density” on page 63.

Note: For more detailed planning, see “Appendix A: Derivation of traffic procedure” on page 85.

Special cases

Combination of users with and without desk telephones

You may have some users with access to desk telephones and some users without access to desk telephones. If this is the case:

1. Determine the anticipated number of portables per cell for users with desk telephones.

2. Determine the anticipated number of portables per cell for users without desk telephones.
3. Adjust the anticipated number of portables per cell value for the users without desk phones (see Table 9).

Table 9: Adjustment for users without desk telephones

Anticipated number of portables for users without desk telephones	Adjusted anticipated number of portables per cell
0	0
1	1.4
2	3.0
3	4.7
4	6.5
5	8.3
6	10.1
7	12.0
8	13.8
9	15.7
10	17.5
11	19.4
12	21.3
13	23.2
14	25.1
15	27.0
16	29.1
17	31.2
18	33.3

Table 9: Adjustment for users without desk telephones (continued) (continued)

Anticipated number of portables for users without desk telephones	Adjusted anticipated number of portables per cell
19	35.4
20	37.5
21	39.7
22	41.8
23	44.0

4. Add the adjusted anticipated portable value and the anticipated portable value of the users with desk phones together.
5. Use the column “Users with a portable telephone and a desk telephone” in Table 8 on page 38 to determine the number of required Base Stations per cell.

Note: Every pair of external antennas requires a Base Station. If external antennas are intended for the cell center, use two external antennas for each Base Station. If only one antenna is used the system will assign the two Base Station radios to different cells.

For more information on using external antennas, see “Covering outdoor areas” on page 26 and “Appendix B: Using indoor external antennas” on page 89.

No office information

If you do not know where any of the users’ offices are, calculate the anticipated number of portables per cell using the following formula:

$$\frac{\text{Number of portables}}{\text{Number of cells}}$$

Reviewing your work

Review your work to insure that the sales group can use it, and that it is complete, legible and acceptable for the installer, maintenance personnel and your customer.

Before finishing your work, you must know:

- the location of the cell centers
- how many Base Stations you need to install at each cell center
- where and how many external antennas to install
- if there were any areas you could not cover

Checking system capacity

- ☐ The number of Base Stations, portables and access lines for the system does not exceed the capacity of the system to be installed.
- ☐ The appropriate number of cells. (You may need to replan the site with multiple systems. If so, see “Planning multiple systems” on page 67.)
- ☐ The recommended location of the Controller is not more than 4,000 ft (1 200 m) (wiring length for 24 AWG) from all cell centers. If it is more, look for other locations for the Controller.

Reviewing with the customer

When you finish, show the customer:

- the final positions of the Base Stations
- any locations where there are too many portables
- installation (and location) of any recommended outdoor external antennas
- any areas where you could not meet the coverage requirements

Note: If you recommend external antennas for outdoor coverage, inform the customer that the coverage is an estimate.

Providing floor plan information

Neatly transfer the information from the working copy of the floor plan to the clean copy. Use colored pens to mark the cell boundaries and corresponding cell centers.

Record the following information on the floor plans:

- all areas needing coverage (indoor and outdoor)
- the location of the Controller
- the locations of the remote power interconnects (RPIs)
- the total number of Base Stations
- all the named cell centers (for example, 2C5) and their corresponding cell boundaries
- all the critical points
- any installation restrictions
- any notes detailing the installation at a particular cell
- the location of external antennas and their Base Stations

Attach a completed traffic table with the floor plans.

Providing provisioning record information

Record the following information on the applicable provisioning record:

- date prepared
- customer information
- site planner information
- cell numbers
- number of Base Stations in each cell
- location of the Base Stations (cell centers)
- anticipated number of users in each cell

Planning a Sample Site

Using what you learned

The following sections show the planning process applied to a sample site.

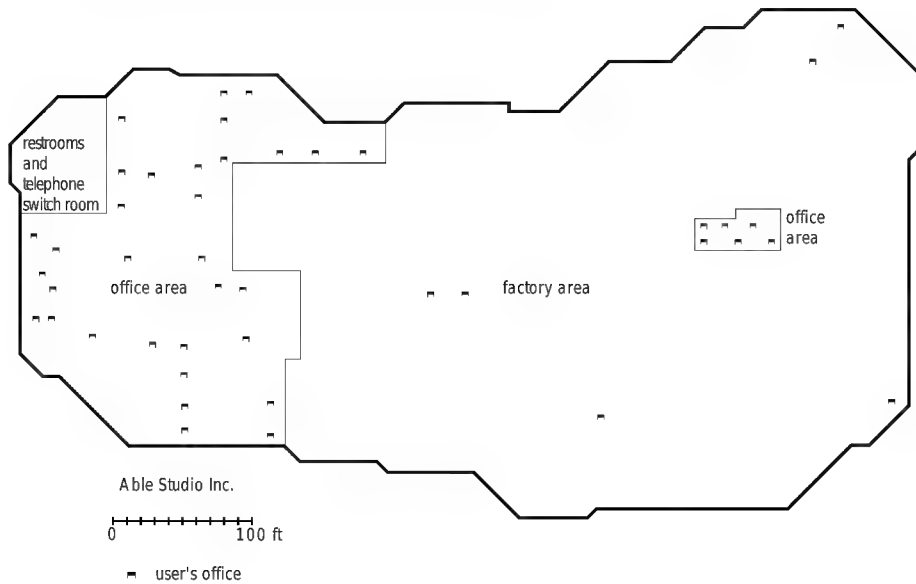
Sample Site: Site information

Before you go to the site, you know the following information:

- The customer is Able Studio Inc. You need a guest lab coat from your contact to be on the site.
- The sales representative has recommended the appropriate Companion system.
- All 44 of the users have offices and desk telephones.
- The customer does not need coverage in restrooms.
- The telephone switch room is beside the restroom.
- The customer has no installation restrictions.

The following figure shows the coverage area, including offices and office areas, the factory area, restrooms and the telephone switch room.

Figure 18: Sample site coverage area

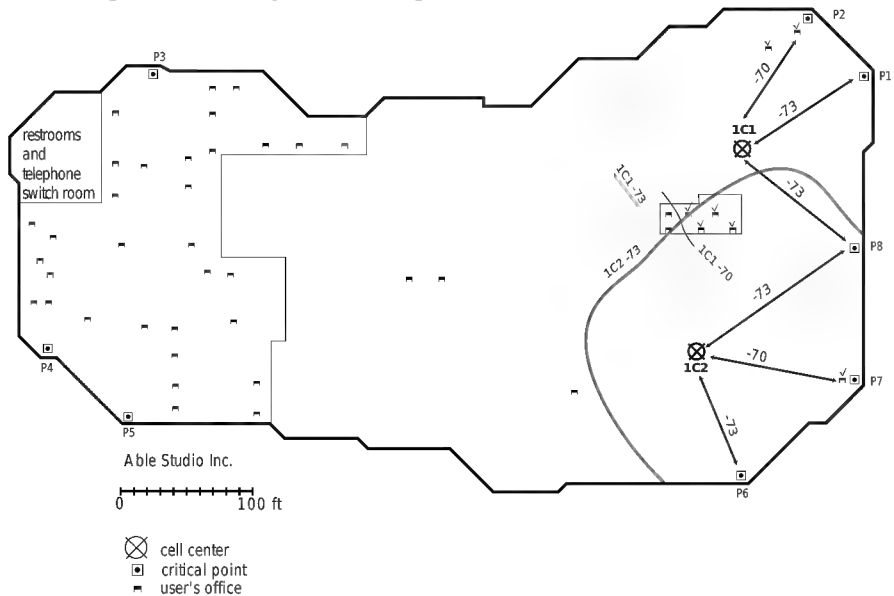


Sample Site: Indoor cell center location

Note: When surveying a site, outdoor areas are surveyed before indoor areas, however there is no outdoor coverage required for Able Studio Inc. For an example of outdoor coverage, refer to “Example outdoor cell center location” on page 54.

As shown in Figure 19, you use the floor plan of Able Studio Inc. to identify the initial critical points P1, P2, P3, P4, P5 and P6. Using critical points P2 and P6, you find that one cell cannot reach both critical points so you add critical point P8 and plan to cover the end of the building with two cells (see “Double-cell technique” on page 33). You use -70 dBm as the cell boundary value from P2, and -73 dBm from P1 and P8 to locate cell center 1C1. You use -70 dBm from P7 and -73 dBm from P6 and P8 to locate cell center 1C2. You use -70 dBm from P2 and P7 because there are users’ offices at these critical points.

Figure 19: Floor plan detailing cells 1C1 and 1C2



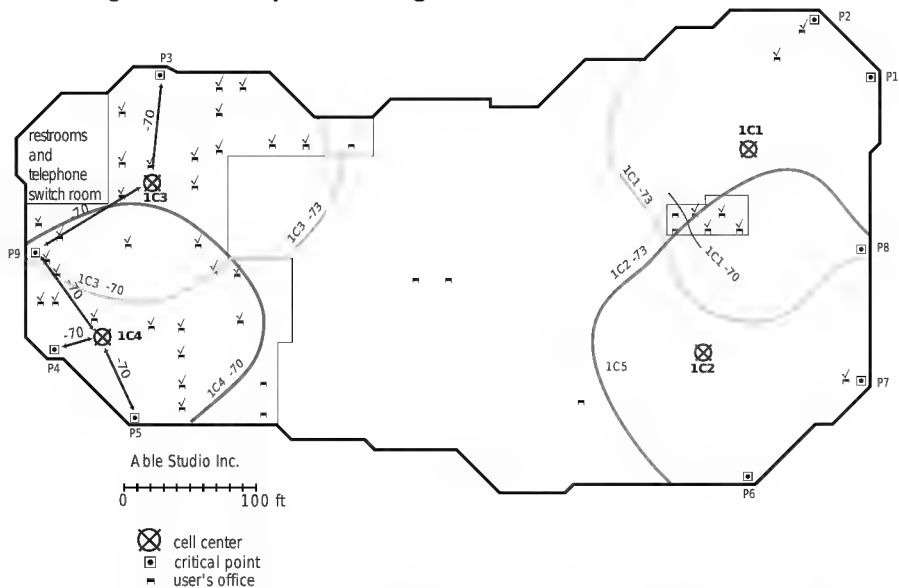
With the CDT placed at 1C1, you find the cell boundary in the factory area using -73 dBm. You confirm that 1C1 covers one other user’s office in the factory area using -70 dBm. Four users’ offices are in the office area within -70 dBm of 1C1. Two users’ offices in the office area are within -73 dBm, but

they are not within -70 dBm of 1C1. Therefore, 1C1 does not cover these users' offices.

Cells 1C1 and 1C2 cover seven users' offices, which you show with checkmarks.

In Figure 20 you set up the CDT transceiver at critical points P3 and P5, and find that one cell center cannot serve both critical points. You add critical point P9 midway between P3 and P5. Using critical points P3 and P9, you find cell center 1C3. Because P3 is in an office area, you use -70 dBm from P3. Because P9 is also in an office area, you use -70 dBm from P9.

Figure 20: Floor plan detailing cells 1C3 and 1C4



To find cell center 1C4 you use -70 dBm from critical points P9, P4 and P5.

With the CDT placed at 1C3, you use -70 dBm in the office area and -73 dBm in the factory area.

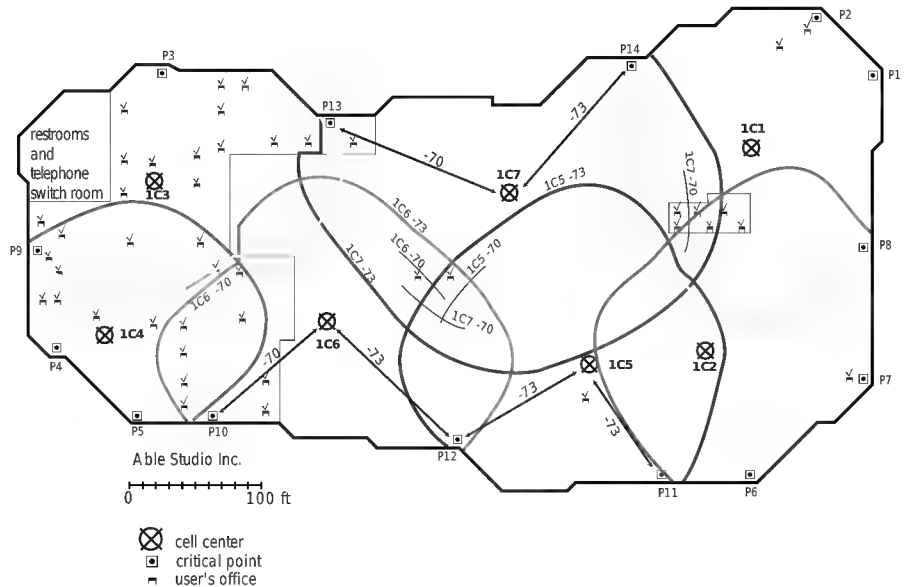
With the CDT placed at 1C4, you use -70 dBm because the entire cell is within an office area.

You mark with a check 29 users' offices as covered by cells 1C3 and 1C4.

In Figure 21 you add critical points P10 and P11. You find that one cell center cannot serve both critical points, so you add critical point P12 midway

between P10 and P11 to find cell centers 1C5 and 1C6. You use -70 dBm from P10 and -73 dBm from P11 and P12.

Figure 21: Completely covered floor plan



You set up the CDT transceiver at cell center 1C6 and find the cell boundary using -70 dBm in the office area and -73 dBm in the factory area. Cell center 1C6 covers one office in the factory area at -73 dBm and two more in the office area at -70 dBm.

From cell center 1C5 you use -73 dBm as the cell boundary value because the entire cell is in the factory area. Cell 1C5 covers one users' office near the cell center.

You add two more critical points (P13 and P14). You find that both of these critical points can be served by cell center 1C7. You use -70 dBm when determining the cell boundary value from P13 in the office area and -73 dBm from P14 in the factory area. You find the cell boundary value using -73 dBm from cell center 1C7 and -70 dBm to confirm the coverage of four users' offices. Cell 1C7 covers the remainder of the site.

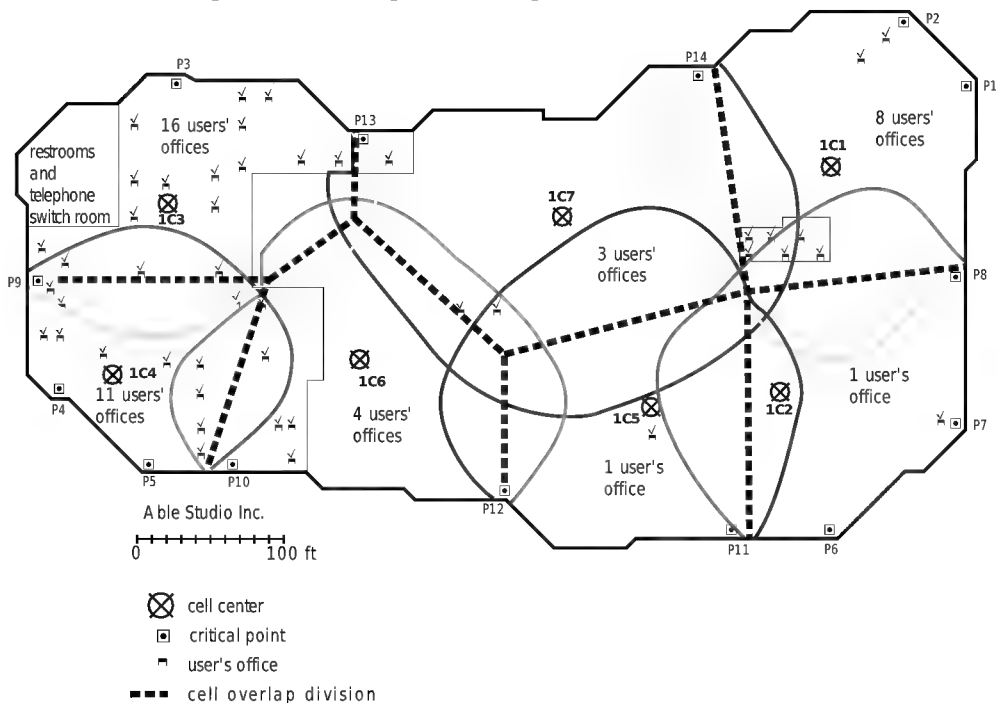
Cell centers 1C5, 1C6 and 1C7 cover eight users' offices.

Sample Site: Determining the number of Base Stations per cell

As shown in Figure 22, the coverage area for Able Studio Inc. has been divided into seven cells with 44 users: eight users' offices in cell 1C1, one user's office in cell 1C2, 16 users' offices in cell 1C3, 11 users' offices in cell 1C4, one user's office in cell 1C5, four users' offices in cell 1C6, and three users' offices in cell 1C7. All the users have desk telephones in their offices.

There are no users without an office.

Figure 22: Dividing the coverage area



Cell center 1C1

1. Number of users inside the cell with an office:

$$8 \times 0.7 = 5.6$$

2. Number of users with an office outside the cell who walk into the cell:

$$\frac{(44 - 8) \times 0.3}{7 - 1} = 1.8$$

3. Anticipated number of portables per cell:

$$5.6 + 1.8 + 0 = 7.4$$

Cell center 1C2

1. Number of users inside the cell with an office:

$$1 \times 0.7 = 0.7$$

2. Number of users with an office outside the cell who walk into the cell:

$$\frac{(44 - 1) \times 0.3}{7 - 1} = 2.15$$

3. Anticipated number of portables per cell:

$$0.7 + 2.15 + 0 = 2.85$$

Cell center 1C3

1. Number of users inside the cell with an office:

$$16 \times 0.7 = 11.2$$

2. Number of users with an office outside the cell who walk into the cell:

$$\frac{(44 - 16) \times 0.3}{7 - 1} = 1.9$$

3. Anticipated number of portables per cell:

$$11.2 + 1.9 + 0 = 13.1$$

Cell center 1C4

1. Number of users inside the cell with an office:

$$11 \times 0.7 = 7.7$$

2. Number of users with an office outside the cell who walk into the cell:

$$\frac{(44 - 11) \times 0.3}{7 - 1} = 1.65$$

3. Anticipated number of portables per cell:

$$7.7 + 1.65 + 0 = 9.35$$

Cell center 1C5

1. Number of users inside the cell with an office:

$$1 \times 0.7 = 0.7$$

2. Number of users with an office outside the cell who walk into the cell:

$$\frac{(44 - 1) \times 0.3}{7 - 1} = 2.15$$

3. Anticipated number of portables per cell:

$$0.7 + 2.15 + 0 = 2.85$$

Cell center 1C6

1. Number of users inside the cell with an office:

$$4 \times 0.7 = 2.8$$

2. Number of users with an office outside the cell who walk into the cell:

$$\frac{(44 - 4) \times 0.3}{7 - 1} = 2$$

3. Anticipated number of portables per cell:

$$2.8 + 2 + 0 = 4.8$$

Cell center 1C7

1. Number of users inside the cell with an office:

$$3 \times 0.7 = 2.1$$

2. Number of users with an office outside the cell who walk into the cell:

$$\frac{(44 - 3) \times 0.3}{7 - 1} = 2.05$$

3. Anticipated number of portables per cell:

$$2.1 + 2.05 + 0 = 4.15$$

Enter the information for cells 1C1 through 1C7 in a traffic table.

Table 10: The Sample Site completed traffic table

	1C1	1C2	1C3	1C4	1C5	1C6	1C7
Users inside the cell with an office	5.6	0.7	11.2	7.7	0.7	2.8	2.1
Users with an office outside of cell who walk into the cell	1.8	2.15	1.9	1.65	2.15	2	2.05
Users without an office	0	0	0	0	0	0	0
Anticipated number of portables per cell	7.4	2.85	13.1	9.35	2.85	4.8	4.15

Using Table 8 on page 38 and recalling that the users have desk telephones in their office, you need a total of 13 Base Stations.

Table 11: The Sample Site required Base Stations

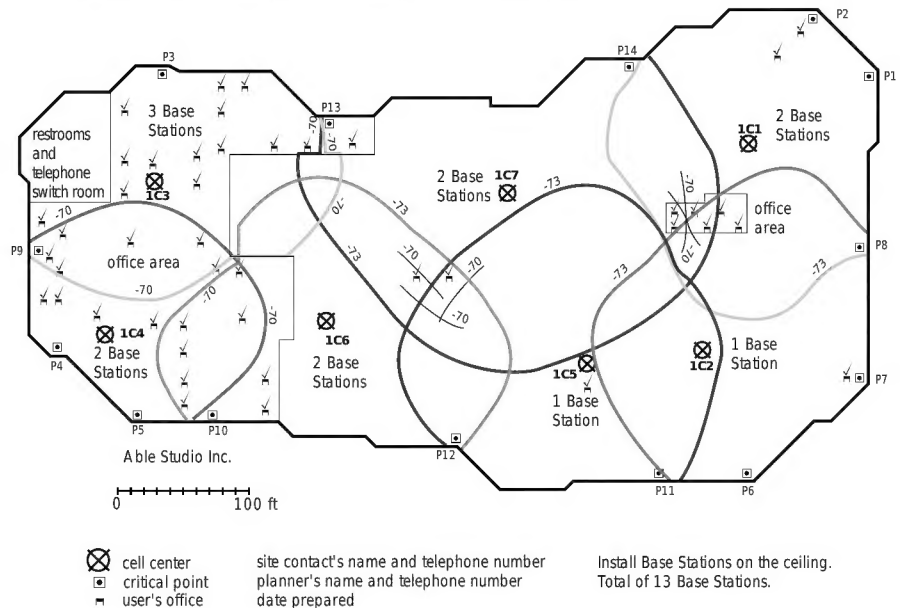
	1C1	1C2	1C3	1C4	1C5	1C6	1C7
Base Stations	2	1	3	2	1	2	2

Sample Site: Reviewing your work

When you have completed the site plan you should have the following:

- a clean, complete floor plan (see Figure 23)
- a traffic table
- a completed provisioning record
- a satisfied customer

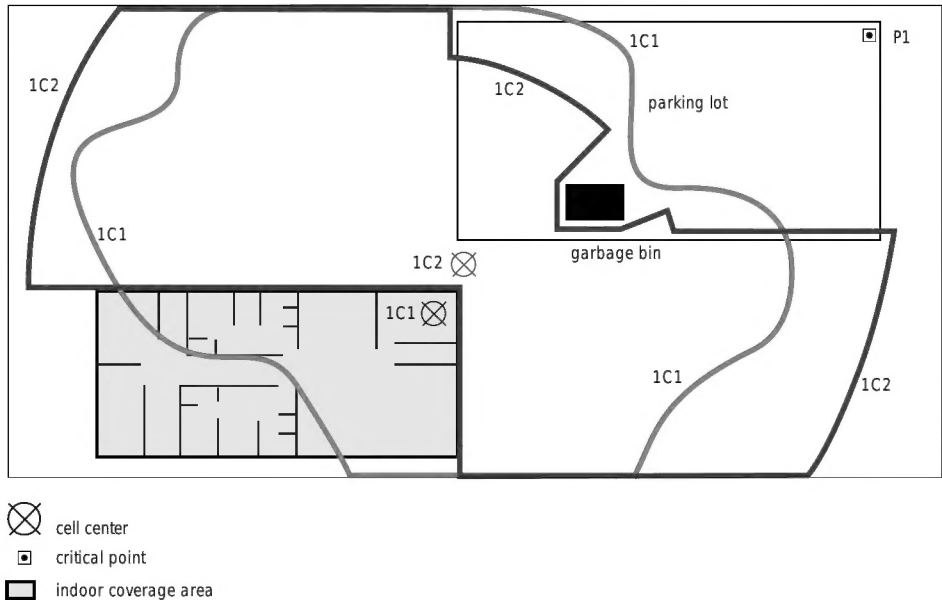
Submit the site plan, traffic table and the provisioning record to the sales group.

Figure 23: Example of a completed floor plan

Example outdoor cell center location

Point P1 in Figure 24 is the critical point in the outdoor coverage example.

Figure 24: Outdoor coverage



You position the CDT transceiver indoors at a window at 1C1 because it is the closest indoor point to critical point P1. You check the parking lot for outdoor coverage. You draw the cell edge of 1C1 and find that it does not reach critical point P1.

You decide on a potential location for outdoor external antennas at 1C2. You estimate 40 in. (1 m) as the length of the coaxial cables required to connect a Base Station at 1C1 to the outdoor external antennas at 1C2. Using Table 6 on page 28 you determine that with a 40 in. (1 m) cable the range for the parking lot is 230 ft (70 m), and 550 ft (168 m) for the lawn. You draw a circle on the floor plan with a radius of 230 ft (70 m) over the parking lot and 550 ft (168 m) over the lawn. You crop the arcs around the garbage bin, the building and the coverage area.

In this example, the CDT at 1C1 covers the parking lot better than the predicted area using the outdoor external antennas. You recommend the location of the cell center at 1C1.

Inform the customer of the actual coverage area and that the range could not reach the critical point.